



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re DIVISIONAL Patent Application of       )  
Toshimitsu KONUMA et al.                               )  
Based On Serial No. 08/592,672                       ) Art Unit: 2515  
Which Was Filed: January 26, 1996               ) Examiner: T. Nguyen  
For: LIQUID-CRYSTAL                                       )  
     ELECTRO-OPTICAL APPARATUS                       )  
     AND METHOD OF   )  
     MANUFACTURING THE SAME                       ) Date: April 14, 1998

*#2 cited  
#1  
6/2/98  
[Signature]*

INFORMATION DISCLOSURE STATEMENT

Honorable Assistant Commissioner for Patents  
Washington, D.C. 20231

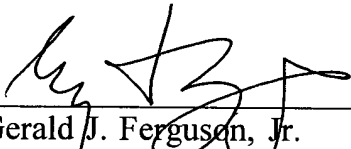
Sir:

In accordance with the provisions of 37 C.F.R. 1.56 and 37 C.F.R. 1.97-1.99, it is requested that the references listed on the attached Form PTO-1449 be made of record in the above-identified application.

The references listed on the attached Form PTO-1449 were cited in parent application Serial No. 08/592,672 filed January 26, 1996; and its

predecessor application Serial No. 08/278,088.

Respectfully submitted,



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**UNITED STATES DEPARTMENT OF COMMERCE**  
**Patent and Trademark Office**

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SERIAL NUMBER	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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08/278,088 07/20/94 KONUMA

T 07561085

**EXAMINER**

NGUYEN, T

BSM1/0202

SIXBEY, FRIEDMAN, LEEDOM & FERGUSON  
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2010 CORPORATE RIDGE  
MCLEAN, VA 22102

**ART UNIT**

**PAPER NUMBER**

2515

DATE MAILED: 02/02/96

**This is a communication from the examiner in charge of your application.**  
**COMMISSIONER OF PATENTS AND TRADEMARKS**

☒ This application has been examined ☒ Responsive to communication filed on 11/3/95 ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), — days from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

**Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:**

1. ☒ Notice of References Cited by Examiner, PTO-892. 2. ☐ Notice of Draftsman's Patent Drawing Review, PTO-948.  
3. ☐ Notice of Art Cited by Applicant, PTO-1449. 4. ☐ Notice of Informal Patent Application, PTO-152.  
5. ☐ Information on How to Effect Drawing Changes, PTO-1474. 6. ☐ \_\_\_\_\_

## Part II SUMMARY OF ACTION

1. ☒ Claims 1-21 are pending in the application.  
Of the above, claims \_\_\_\_\_ are withdrawn from consideration.
2. ☒ Claims 22-30 have been cancelled.
3. ☒ Claims 21 are allowed.
4. ☒ Claims 1-3, 5-9, 11, 16-20, 12-15 are rejected.
5. ☒ Claims 4, 10 are objected to.
6. ☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.
7. ☐ This application has been filed with Informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on \_\_\_\_\_. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable; ☐ not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on \_\_\_\_\_, has (have) been ☐ approved by the examiner; ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed \_\_\_\_\_, has been ☐ approved; ☐ disapproved (see explanation).
12. ☒ Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☒ been received ☐ not been received ☐ been filed in parent application, serial no. \_\_\_\_\_; filed on \_\_\_\_\_.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other \_\_\_\_\_

### EXAMINER'S ACTION

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*Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1,2,3,5,7,9 are rejected under 35 U.S.C. § 102(b) as being anticipated by Tsuboyama'979.

The above claims are anticipated by Tsuboyama's fig.1 and accompanying text which disclose an LCD matrix device comprising:

- ferroelectric liquid crystal (5);
- supporting plates (1a,1b) with electrode arrangements (2a,2b) as claimed;
- orientation films (3a,3b) as claimed;
- resinous films (4a,4b) which can be made up of polyvinyl alcohol-type polymer (col.4, lines 58-63); films (3a) and (4a) suppress the orientation control effect of one another, and films (3b) and (4b) suppress the orientation control effect of one another (see figs. 4A-4D).

Tsuboyama further discloses that orientation films (3a,3b) can be of type C, which has a homogeneous (uniaxial) or horizontal alignment power (col. 4, lines 64-65), and films (4a,4b) can be of type D, which can be formed of a silane coupling agent.

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3. Claims 5,6 are rejected under 35 U.S.C. § 102(b) as being anticipated by Hoshikawa'583.

Claims 5,6 are anticipated by Hoshikawa's fig. 14 and accompanying text which disclose an LCD device comprising:

- liquid crystal layer (12);
- supporting plates (10,11) with electrode arrangement (7) as claimed;
- orientation control means (8);
- barrier layer (5) which can be formed on the inside surface of one of the supporting plates between that plate and the liquid crystal layer and made of a uv-cured resin (col.12, lines 67 - col.13, line 4).

4. Claims 5,11 are rejected under 35 U.S.C. § 102(b) as being anticipated by Kojima'575.

Claims 5,11 are anticipated by Kojima's fig. 4 and accompanying text which disclose an LCD device comprising:

- ferroelectric liquid crystal layer (42);
- supporting plates (14A,14B) with electrode arrangement (12A,12B) as claimed;
- insulating films (13A,13B) formed of organic resins (col.5 lines 3-5) interposed between the supporting plates and the liquid crystal layer as claimed;
- orientation means (41A,41B) which can be rubbing films (col.6, lines 58-67).

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5. Claim 20 is rejected under 35 U.S.C. § 102(b) as being anticipated by Clark'855.

Claim 20 is anticipated by Clark, which discloses a color matrix LCD device (col. 29, lines 48+) comprising:

- Surface Stabilized Ferroelectric Liquid Crystal (SSFLC)

device comprising:

- a. ferroelectric liquid crystal and a pair of substrates with inherent electrode arrangement as claimed (col. 1, lines 43-62); the helical structure of the liquid crystal is eliminated even when no voltage is applied because the substrates are sufficiently close together (col. 1, lines 52-55);
- b. TFT array for driving the LCD pixels (col. 29, line 59);
- c. uniaxial alignment films formed on the substrates (col. 1, lines 44-47);
- d. Continuous field-variable birefringence being applied to the TFT array, i.e. variable voltages applied to the TFTs to gradually change the orientation direction of the liquid crystal molecules, with the direction depending on the strength of the voltages (or electric fields) (col. 29, lines 55-66).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a

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whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

7. Claim 8 is rejected under 35 U.S.C. § 103 as being unpatentable over Tsuboyama'979 in view of Tokyo Institute of Technology Article (TIT Article).

Regarding claim 8, Tsuboyama discloses the claimed invention except for the use of antiferroelectric liquid crystal. The TIT Article discloses the use of antiferroelectric liquid crystal for tristable switching. It would have been obvious to one of ordinary skill in the art at the time of the invention to use antiferroelectric liquid crystal in Tsuboyama because it allows for a third stable switching state between bright and dark states; thus, improving the contrast of the overall display.

8. Claims 12-15 are rejected under 35 U.S.C. § 103 as being unpatentable over Tsuboyama'979 in view of Yoshinaga'306.

Claims 12-15 are disclosed by Tsuboyama except for (a) the use of a resin between the orientation film and the liquid crystal layer; (b) the use of TFTs to drive the liquid crystal layer; and (c) the uniaxial orientation control means being a rubbing layer. Yoshinaga discloses that a homeotropic aligning film can be formed of a silane coupling agent or other

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types of polymer (resin) (col. 15, lines 7-11); it is well known in the art to use TFTs to reduce crosstalks between adjacent liquid crystal pixels; and it is well known in the art to use a rubbing layer for an alignment layer. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Tsuboyama by using a polymer (resin) for the type D films (4a,4b), TFTs to drive the liquid crystal pixels, and a rubbing layer for the uniaxial alignment layers (3a,3b). The modifications would have been obvious for the following reasons:

- Yoshinaga shows that a silane coupling agent and a polymer material are art-recognized functional equivalent for use as a homeotropic aligning film.
- TFTs as switching devices for liquid crystal pixels reduce crosstalks between the pixels as mentioned above.
- The rubbing process used to produce an alignment layer is conventional in the art; thus, the use of a rubbing layer for an alignment layer is well known.

9. Claims 16-19 are rejected under 35 U.S.C. § 103 as being unpatentable over Tsuboyama'979 in view of Yoshinaga'306 as applied to claims 12-15 above, and further in view of Takemura'449.

Regarding claims 16-19, Tsuboyama in view of Yoshinaga discloses the claimed invention except for the pixel driving method of frame gradation display with certain voltage duration. Takemura discloses such driving method in columns 2 and 10 to provide a display



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having shades of gray, clear images, and a high contrast ratio (col. 2, lines 10-18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use Takemura's driving method in driving the above modified Tsuboyama's LCD device for the same reason as stated in Takemura.

*Allowable Subject Matter*

10. Claims 4,10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claim 21 is allowable over the prior art of record.

*Reasons for Allowance*

12. The following is an Examiner's Statement of Reasons for Allowance:

Claims 4, 10, and 21 are allowable because the references of record neither disclose nor make obvious an LCD device comprising a liquid crystal layer, orientation control means, and most importantly, a resin made up of grains formed outside of the liquid crystal layer with the grain diameter not larger than 500 nm or the grains distributed between the liquid crystal layer and a uniaxial orientation means.

Any comments considered necessary by applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferably **accompany** the

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Issue Fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiep Nguyen whose telephone number is (703) 305-3496.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-1615.



**ANITA PELLMAN GROSS  
PRIMARY EXAMINER  
GROUP 2500**